

# Hand-washing practices and techniques among clinical students of Bayero University Kano, Nigeria

Abdulsalam Mohammed,  
Ibrahim Aliyu

Department of Paediatrics, Bayero  
University, Aminu Kano Teaching  
Hospital, Kano, Nigeria

## Abstract

**Background:** Hand-washing is an important and a single most cost-effective and practical measure that reduces the incidence of infection and cross infection among health-care providers and patients. However, compliance of health-care workers to hand hygiene guidelines are reportedly poor. It is important, therefore, to instill adequate knowledge and good attitudes and practices at the time of primary training of future health-care workers. **Materials and Methods:** This was a descriptive cross-sectional study carried out among randomly selected clinical students of Bayero University Kano. The questionnaires were administered to the students during their daily ward rounds and clinic sessions. **Results:** One hundred and thirty-seven medical and nursing students of Bayero University Kano, who were on clinical posting were studied. Sixty-three (46%) students were aware of the Global Hand-washing day ( $\chi^2 = 5.989$ ,  $df = 2$ ,  $P = 0.050$ ). Only 16 (11.7%) students were able to state correctly the Global Hand-washing date. One hundred and thirty-one (96%) students believe that hand-washing if correctly done can reduce the risk of infection. One hundred and fourteen (83.2%) students were taught hand-washing technique ( $\chi^2 = 6.862$ ,  $df = 1$ ,  $P = 0.009$ ). One hundred and twenty-two (89.1%) of the students use soap and water or hand rubs in washing their hands. One hundred and two (74.5%) students are not aware of the World Health Organization five moments of hand-washing hygiene. Only 13 (9.5%) students were able to mention the steps of hand-washing correctly ( $\chi^2 = 10.285$ ,  $df = 2$ ,  $P = 0.006$ ). Eighty-six (62.8%) students adhere to the principles of hand-washing in their clinical postings ( $\chi^2 = 4.404$ ,  $df = 1$ ,  $P = 0.036$ ). Seventy-two (52.6%) students wash their hands before handling patients ( $\chi^2 = 7.575$ ,  $df = 1$ ,  $P = 0.006$ ), but the majority 130 (94.9%) of them wash their hands after handling patients. **Conclusion:** There is a need for continuous teaching of medical and nursing students on the correct hand-washing techniques and to inculcate in them the habit of hand-washing before and after touching patients. This will greatly improve the safety of the potential health-care providers and patients.

**Key words:** Hand-washing, hygiene, medical, nursing, students

## INTRODUCTION

Health-care associated infections due to poor hand hygiene have been linked to an unacceptably high level of morbidity,

mortality, and health-care costs.<sup>[1,2]</sup> In developing countries, its prevalence is found to be as high as 19%.<sup>[3]</sup> Effective hand hygiene can lower the prevalence of health-care associated infections. Unfortunately, the prevalence of these infections continue to rise and pose challenges to health-care providers.<sup>[1]</sup> In spite of being a very simple action, compliance with hand hygiene among health-care providers is as low as <40%.<sup>[4-6]</sup> To address this problem of lack of compliance with hand hygiene, continuous efforts are being made to identify effective and sustainable strategies. One of such efforts is the introduction of an evidence-based concept of “my five moments for hand

### Access this article online

#### Quick Response Code:



#### Website:

www.sudanmedicalmonitor.org

#### DOI:

10.4103/1858-5000.160942

### Address for correspondence:

Dr. Abdulsalam Mohammed, Department of Paediatric, Aminu Kano Teaching Hospital, Kano, Nigeria. E-mail: muhdpaed@yahoo.com

hygiene” by World Health Organization (WHO). These five moments that call for the use of hand hygiene include the moment before touching a patient, before performing aseptic and clean procedures, after been at risk of exposure to body fluids, after touching a patient, and after touching patient surroundings.<sup>[7]</sup> This concept has been aptly used to improve understanding, training, monitoring, and reporting hand hygiene among health-care workers in spite of the fact that some recent research has recommended more cautious approach in the universal adoption of this concept.<sup>[8]</sup> Another strategy is to ensure proper education of the trainee health workforce, and in this regard, multiple studies have been conducted to study the hand hygiene practices of nursing and medical students. Such studies are important as the students in their clinical training phase through the health-care facilities and can potentially transmit infections besides being the health-care providers of future when their pattern of training will reflect on their infection control practices.<sup>[9-13]</sup> The Center for Disease Control and Prevention (CDC)<sup>[14]</sup> has stated: “It is well-documented that one of the most important measures for preventing the spread of pathogens is effective hand-washing. It protects best against diseases transmitted through fecal-oral routes (such as many forms of stomach flu) and direct physical contact (such as impetigo).<sup>[15]</sup> The purpose of hand-washing in the health-care setting is to remove pathogenic micro-organisms (“germs”) and avoid transmitting them. There are reports that a lack of hand-washing remains at unacceptable levels in most medical environments, with large numbers of doctors and nurses routinely forgetting to wash their hands before touching patients.<sup>[16]</sup> One study showed that proper hand-washing and other simple procedures can decrease the rate of catheter-related bloodstream infections by 66%.<sup>[17]</sup>

Hand-washing behavior has been shown to cut the number of child deaths from diarrhea (the second leading cause of child deaths) by almost half and from pneumonia (the leading cause of child deaths) by one-quarter.<sup>[18]</sup> There are five critical times in washing hands with soap and/or using of a hand antiseptic related to fecal-oral transmission: After using a bathroom (private or public), after changing a diaper, before feeding a child, before eating and before preparing food or handling raw meat, fish or poultry or any other situation leading to potential contamination.<sup>[19]</sup> To reduce the spread of germs, it is also better to wash the hands and/or use a hand antiseptic before and after tending to a sick person. The CDC recommends hand-washing over hand sanitizer rubs, particularly when hands are visibly dirty.<sup>[14]</sup> The increasing use of these agents is based on their ease of use and rapid killing activity against micro-organisms; however, they should not serve as a replacement for proper hand-washing unless soap and water are unavailable.<sup>[20]</sup>

Studies have been conducted in Nigeria to study hand hygiene practices in certified health-care providers,<sup>[11,12]</sup> but only one significant study has been undertaken where medical students were also evaluated.<sup>[13]</sup> In view of the importance attached to hand-washing, we carried out a study to determine the hand-washing practices and techniques among clinical students of Bayero University Kano. This will help inculcate the basic knowledge of hand hygiene in this category of people to reduce the rate of infections and contamination among the patients they handle, thereby improving patients survival. The clinical students are the students on clinical posting in Aminu Kano Teaching Hospital (AKTH). Hence, the study was conducted in AKTH.

## MATERIALS AND METHODS

This was a descriptive cross-sectional study carried out among medical and nursing students of Bayero University Kano, who were on clinical posting. The study was conducted between August 2014 and March 2015. Permission from the Ethics Committee of AKTH, Kano was obtained to conduct this study and consent was obtained from the students. The questionnaires were pretested and were self-administered by the students during their daily ward rounds and clinic sessions. The contents of the questionnaires included age, sex, status (medical or nursing student), academic level, awareness of global hand-washing day, whether or not taught on hand-washing technique, agents used in hand-washing, five moments in hand-washing and ability to list them, having seen poster on hand-washing technique, steps in hand-washing, adherence to principle of hand-washing, washing hands before and after touching patients or after handling secretions or body fluids of patients, washing hands before wearing and after removing hand gloves and after using toilets.

### Data analysis

The information obtained from the subjects was entered and subsequently analyzed using SPSS 16 Microsoft Corporation version 3.1.0.0 Windows Installer –KB893803-X86. Quantitative variables were summarized using means and medians, while qualitative variables were summarized using frequencies and percentages, and categorical variables were compared using Chi-square test of significance, while  $P < 0.05$  was considered as being statistically significant.

## RESULTS

One hundred and thirty-seven clinical students of BUK who were on clinical posting were studied. Among this number 101 (73.72%) were medical students, while

36 (26.28%) were nursing students. There were 84 (61.31%) males and 53 (38.69%) females with male to female ratio of 1.6:1. Their ages ranged from 20 to 36 years with mean age of 25.31 years  $\pm$  2.93. Sixty-three (46%) students are aware of the Global hand-washing day while 74 (54%) were not aware of the global hand-washing day. Among those who are aware, 51 (37.23%) are medical students while 12 (19.05%) are nursing students.  $\chi^2 = 3.147$ ,  $df = 1$ ,  $P = 0.076$ . This is not statistically significant. Only 16 (11.68%) students were able to state correctly the Global hand-washing date 8 (5.84%) each from medical and nursing students. One hundred and twelve (81.75%) did not know the global hand-washing date and of these 85 (62.04%) were medical students, and 27 (19.71%) were nursing students. This is not statistically significant ( $\chi^2 = 5.989$ ,  $df = 2$ ,  $P = 0.050$ ).

The majority of the students (95.62%) believe that hand-washing if done correctly can reduce the risks of infection. Among those who believe 97 (74.05%) were medical students, while 34 (25.95%) were nursing students.  $\chi^2 = 0.161$ ,  $df = 1$ ,  $P = 0.688$ . This is not statistically significant. One hundred and fourteen (83.21%) students were taught hand-washing technique and of these, 79 (69.30%) are medical students, while 35 (30.70%) are nursing students [Table 1]. Those that were not taught hand-washing technique constituted only 16.79%. This is statistically significant ( $\chi^2 = 6.862$ ,  $df = 1$ ,  $P = 0.009$ ). The majority (89.05%) of the students uses water and soap or hand rubs as agents of hand-washing.

Among the medical students, only 29 (28.72%) were aware of the five moments in hand-washing, whereas 72 (71.29%) of them were not aware of the five moments in hand-washing. This is statistically significant ( $\chi^2 = 10.472$ ,  $df = 1$ ,  $P = 0.001$ ). Among the nursing students only 6 (16.67%) were aware of the five moments in hand-washing, while 30 (83.33%) were not aware of the five moments in hand-washing ( $\chi^2 = 14.40$ ,  $df = 1$ ,  $P = 0.000$ ). This is statistically significant.

Table 2 shows that only 13 (9.49%) students knew the correct steps of hand-washing while 86 (62.77%) did not know the steps of hand-washing. This is statistically significant ( $\chi^2 = 10.285$ ,  $df = 2$ ,  $P = 0.006$ ).

Table 3 compares those that were taught hand-washing and adherence to principles of hand-washing. It showed that 86 (62.77%) students adhered to principles of hand-washing and 76 (55.47%) were taught hand-washing, while 10 (7.3%) were not taught hand-washing. This is also statistically significant ( $\chi^2 = 4.404$ ,  $df = 1$ ,  $P = 0.036$ ).

Table 4 shows that 72 (52.55%) students washed their hands before touching patients and among them 64 (46.72%)

**Table 1: Clinical students taught hand-washing technique**

Status of students	Taught hand-washing technique (%)		
	No	Yes	Total
Medical students	22 (16.06)	79 (57.66)	101 (73.72)
Nursing students	1 (0.73)	35 (25.55)	36 (26.28)
Total	23 (16.79)	114 (83.21)	137 (100)

**Table 2: Knowledge of the steps of hand-washing technique among clinical students**

Status of student	Steps of hand-washing (%)			
	Correct	Incorrect	Do not know	Total
Medical student	9 (6.57)	21 (15.33)	71 (51.82)	101 (73.72)
Nursing student	4 (2.92)	17 (12.41)	15 (10.95)	36 (26.28)
Total	13 (9.49)	38 (27.74)	86 (62.77)	137 (100)

**Table 3: Adherence to principles of hand-washing compared with knowledge of hand-washing**

Taught hand-washing	Adherence to principles of hand-washing (%)		
	No	Yes	Total
No	13 (9.49)	10 (7.3)	23 (16.79)
Yes	38 (27.74)	76 (55.47)	114 (83.21)
Total	51 (37.23)	86 (62.77)	137 (100)

**Table 4: Practice of hand-washing among clinical students**

Taught hand-washing	Washing hands before touching patients (%)		
	No	Yes	Total
No	15 (10.95)	8 (5.84)	23 (16.79)
Yes	50 (36.5)	64 (46.72)	114 (83.21)
Total	65 (47.45)	72 (52.55)	137 (100)
Washing hands after touching patients			
No	1 (0.73)	22 (16.06)	23 (16.79)
Yes	6 (4.48)	108 (78.83)	114 (83.21)
Total	7 (5.11)	130 (94.89)	137 (100)

were taught hand-washing, while 8 (5.84%) were not taught. Sixty-five (47.45%) did not wash their hands before touching patients, and of these 50 (36.50%) were taught hand-washing ( $\chi^2 = 3.501$ ,  $df = 1$ ,  $P = 0.061$ ). This is not statistically significant.

One hundred and thirty (94.89%) students wash their hands after touching patients, and of these 108 (78.83%) were taught hand-washing. However, there is no statistical significance ( $\chi^2 = 0.033$ ,  $df = 1$ ,  $P = 0.856$ ).

Table 5 shows that 26 (18.98%) nursing students wash their hands before touching patients whereas 46 (33.58%) medical students wash their hands before touching

patients. This is statistically significant ( $\chi^2 = 7.575$ ,  $df = 1$ ,  $P = 0.006$ ). The majority of medical students and nursing students washed their hands after touching patients; 95 (69.34%) and 35 (25.55%), respectively. This is not statistically significant ( $\chi^2 = 0.548$ ,  $df = 1$ ,  $P = 0.459$ ).

Thirty-six nursing students and 97 (70.8%) medical students wash their hands after handling body fluids or secretion from patients. This is not statistically significant ( $\chi^2 = 1.469$ ,  $df = 1$ ,  $P = 0.226$ ).

Seventy-three (53.28%) medical students did not wash their hands before wearing gloves, and 23 (16.79%) nursing students did not wash their hands before wearing gloves ( $\chi^2 = 0.891$ ,  $df = 1$ ,  $P = 0.345$ ). This is not statistically significant.

However, a total of 108 (78.83%) students washed their hands after removing hand gloves from which 74 (68.53%) are medical students while 34 (31.50%) nursing students washed their hands after removing their hand gloves ( $\chi^2 = 7.133$ ,  $df = 1$ ,  $P = 0.008$ ). This is statistically significant. A total of 135 (98.54%) students washed their hands after visiting or using the restroom. This comprised of 35 (97.2%) of nursing students and 100 (99%) of the medical students

Table 6 shows that 70 (51.09%) students washed their hands before and after touching patients while 60 (43.8%) wash their hands only after touching patients.

## DISCUSSION

In this study, the students had below average knowledge especially with regard to awareness of the global hand-washing day. However, the majority of students were taught hand-washing technique. This is similar to the study from Srilanka,<sup>[1]</sup> where the students had a fair knowledge of hand hygiene. However, it contrasted with that of Snow *et al.*<sup>[9]</sup> who found that medical students had a low overall rate of hand hygiene. Van De Mortel *et al.*<sup>[10]</sup> in their study found that nursing students' hand hygiene knowledge and self-reported practices were significantly better than that of medical students. This contrasted with the findings in this study, where both the nursing and medical students showed good adherence to the principles of hand hygiene with adherence rate of 62.8%. It is also clear that the majority of the students had prior knowledge of hand-washing technique and believed that hand-washing if correctly done can reduce rates of infection. However, many of them did not know the WHO five moments of hand-washing and correct steps of hand-washing. This probably resulted from the extent, manner, and the frequency of the hand-washing training. This is similar to the study from Port Harcourt by

**Table 5: Differences among medical and nursing students in the practice of hand-washing**

Status of students	Washing hands before touching patients (%)		
	No	Yes	Total
Medical students	55 (40.15)	46 (33.58)	101 (73.72)
Nursing students	10 (7.30)	26 (18.98)	36 (26.28)
Total	65 (47.45)	72 (52.55)	137 (100)
<b>Washing hands after touching patients</b>			
Medical students	6 (4.38)	95 (69.34)	101 (73.72)
Nursing students	1 (0.73)	35 (25.55)	36 (26.28)
Total	7 (5.11)	130 (94.89)	137 (100)
<b>Washing hands after handling body fluids/secretions from patients</b>			
Medical students	4 (2.92)	97 (70.80)	101 (73.72)
Nursing students	0	36 (26.28)	36 (26.28)
Total	4 (2.92)	133 (97.08)	137 (100)
<b>Washing hands before wearing gloves</b>			
Medical students	73 (53.28)	28 (20.44)	101 (73.72)
Nursing students	23 (16.79)	13 (9.49)	36 (26.28)
Total	96 (70.07)	41 (29.93)	137 (100)

**Table 6: Comparing clinical students who wash hands before and after touching patients**

Wash hands before touching patients	Wash hands after touching patients (%)		
	No	Yes	Total
No	5 (3.65)	60 (43.8)	65 (47.45)
Yes	2 (1.46)	70 (51.09)	72 (52.55)
Total	7 (5.11)	130 (94.89)	137 (100)

Opara and Alex-Hart,<sup>[21]</sup> where critical times recognized in hand-washing with soap were after defecation and before meals and snacks. This is also similar to what was observed globally where rates of hand-washing with soap at critical moments ranged from 0% to 34%.<sup>[22,23]</sup>

The majority (89%) of the students used soap and water or hand rubs to wash or clean their hands. This may be related to the prior knowledge they acquired from training in personal hygiene. However, it was also observed that there was low (53%) rate of hand-washing among the students before touching patients in which many (72%) of the nursing students and few (45%) medical students wash their hands before touching patients. This is comparable to the study by Opara and Alex-Hart<sup>[21]</sup> from Port Harcourt, where students did not wash their hands at critical times when hand-washing was required, which made the rate in the general public who are naïve in hand-washing to be expectedly lower.

On the other hand, a higher rate of hand-washing was observed after touching patients (94.9%) or handling body secretions or fluids. All the nursing students and many (71%) medical students wash their hands after



handling body fluids or secretions from patients. This may be due to the fear of contracting the disease as reported from Port Harcourt by Opara and Alex-Hart<sup>[21]</sup> and other studies.<sup>[24]</sup> This finding could be attributed to their knowledge of disease transmission and personal need for protection. However, there was a low rate of hand-washing before wearing hand gloves in both the medical and nursing students but the majority (78.8%) of them wash their hands after removing their hand gloves. This can as well be attributed to knowledge of disease transmission personal need for protection.

Almost all the students (99%) reported that they washed their hands after visiting or using the restroom. This is similar to a study by Scott *et al.*<sup>[25]</sup> in Ghana in which the strongest indicators for hand-washing with soap were related to social acceptance and disgust for feces.

## CONCLUSION

The study shows the need for improvement of the hand hygiene training programs to address the gaps in knowledge, attitudes, and practices. There is an almost absolute lack of knowledge of the WHO five moments and correct steps in hand-washing among clinical students. There is also low hand-washing rate before wearing hand gloves and before touching patients among medical and nursing students. Further display of infection prevention notices and active involvement of staffs in continuous teaching and demonstrating correct hand hygiene, as well as encouraging students to adhere to good hand hygiene practices will be useful in increasing hand hygiene compliance among these students. This will improve hand hygiene practices of fully qualified doctors in future, resulting in reduced infection and cross infection among patients and health-care providers.

## REFERENCES

1. Ariyaratne MH, Gunasekara TD, Weerasekara MM, Kottahachchi J, Kudavidanage BP, Fernando SS. Knowledge, attitudes and practices of hand hygiene among final year medical and nursing students at the University of Srilanka Jayewardanepura. *Sri Lankan J Infect Dis* 2013;3:15-25.
2. Trampuz A, Widmer AF. Hand hygiene: A frequently missed lifesaving opportunity during patient care. *Mayo Clin Proc* 2004;79:109-16.
3. WHO. The Burden of Health Care-Associated Infection Worldwide. A Summary. Available from: [http://www.who.int/gpsc/country\\_work/summary\\_20100430\\_en.pdf](http://www.who.int/gpsc/country_work/summary_20100430_en.pdf). [Last accessed on 2015 Jan 10].
4. Longtin Y, Sax H, Allegranzi B, Schneider F, Pittet D. Videos in clinical medicine. Hand hygiene. *N Engl J Med* 2011;364:e24.
5. Tibballs J. Teaching hospital medical staff to handwash. *Med J Aust* 1996;164:395-8.
6. Pittet D, Hugonnet S, Harbarth S, Mourouga P, Sauvan V,

7. Touveneau S, *et al.* Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. *Infection Control Programme. Lancet* 2000;356:1307-12.
8. Sax H, Allegranzi B, Uçkay I, Larson E, Boyce J, Pittet D. 'My five moments for hand hygiene': A user-centred design approach to understand, train, monitor and report hand hygiene. *J Hosp Infect* 2007;67:9-21.
9. Chou DT, Achan P, Ramachandran M. The World Health Organization '5 moments of hand hygiene': The scientific foundation. *J Bone Joint Surg Br* 2012;94:441-5.
10. Snow M, White GL Jr, Alder SC, Stanford JB. Mentor's hand hygiene practices influence student's hand hygiene rates. *Am J Infect Control* 2006;34:18-24.
11. van De Mortel TF, Kermode S, Prozano T, Sansoni J. A comparison of the hand hygiene knowledge, beliefs and practices of Italian nursing and medical students. *J Adv Nurs* 2012;68:569-79.
12. Qushmaq IA, Heels-Ansdell D, Cook DJ, Loeb MB, Meade MO. Hand hygiene in the intensive care unit: Prospective observations of clinical practice. *Pol Arch Med Wewn* 2008;118:543-7.
13. Bukhari SZ, Hussain WM, Banjar A, Almaimani WH, Karima TM, Fatani MI. Hand hygiene compliance rate among healthcare professionals. *Saudi Med J* 2011;32:515-9.
14. Basurrah MM, Madani TA. Handwashing and gloving practice among health care workers in medical and surgical wards in a tertiary care centre in Riyadh, Saudi Arabia. *Scand J Infect Dis* 2006;38:620-4.
15. CDC. Antimicrobial spectrum and characteristics of hand-hygiene antiseptic agents. *MMWR Morb Mortal Wkly Rep* 2002;51:45.
16. Stebbins S, Cummings DA, Stark JH, Vukotich C, Mitruka K, Thompson W, *et al.* Reduction in the incidence of influenza A but not influenza B associated with use of hand sanitizer and cough hygiene in schools: A randomized controlled trial. *Pediatr Infect Dis J* 2011;30:921-6.
17. Goldmann D. System failure versus personal accountability – The case for clean hands. *N Engl J Med* 2006;355:121-3.
18. Pronovost P, Needham D, Berenholtz S, Sinopoli D, Chu H, Cosgrove S, *et al.* An intervention to decrease catheter-related bloodstream infections in the ICU. *N Engl J Med* 2006;355:2725-32.
19. Beggs CB, Shepherd SJ, Kerr KG. Increasing the frequency of hand washing by healthcare workers does not lead to commensurate reductions in staphylococcal infection in a hospital ward. *BMC Infect Dis* 2008;8:114.
20. Fischler GE, Fuls JL, Dail EW, Duran MH, Rodgers ND, Waggoner AL. Effect of hand wash agents on controlling the transmission of pathogenic bacteria from hands to food. *J Food Prot* 2007;70:2873-7.
21. Edmonds SL, Mann J, McCormack RR, Macinga DR, Fricker CM, Arbogast JW, *et al.* SaniTwice: A novel approach to hand hygiene for reducing bacterial contamination on hands when soap and water are unavailable. *J Food Prot* 2010;73:2296-300.
22. Opara PI, Alex-Hart BA. Hand washing practices amongst medical students. *Niger Health J* 2009;9:16-20.
23. Weese J, Johnson JA. Food Safety: It's in Your Hands. Alabama A and M and Auburn Universities. Available from: <http://www.aces.edu/pubs/docs/H/HE-0610.pdf>. [Last accessed on 2010 Sep 06].
24. Planners Guide for Global Hand Washing. Available from: <http://www.globalhandwashingday.org>. [Last accessed on 2015 Jan 8].
25. Pittet D, Simon A, Hugonnet S, Pessoa-Silva CL, Sauvan V, Perneger TV. Hand hygiene among physicians: Performance, beliefs, and perceptions. *Ann Intern Med* 2004;141:1-8.
26. Scott B, Curtis V, Rabie T, Garbrah-Aidoo N. Health in our hands, but not in our heads: Understanding hygiene motivation in Ghana. *Health Policy Plan* 2007;22:225-33.

**How to cite this article:** Mohammed A, Aliyu I. Hand-washing practices and techniques among clinical students of Bayero University Kano, Nigeria. *Sudan Med Monit* 2015;10:51-5.

**Source of Support:** Nil. **Conflict of Interest:** None declared.